openreach

# SIN 227

**Issue 3.10**
November 2024

**Suppliers' Information Note**
*For The Openreach Network*

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# CDS ™
# CALLING LINE IDENTIFICATION SERVICE SERVICE DESCRIPTION and WITHDRAWAL NOTIFICATION

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## 1. INTRODUCTION

**1.1** This Suppliers Information Note (SIN) has been prepared to give technical information about the BT **CDS**™ [i] Calling Line Identification (CLI) Service which is provided over the analogue Openreach local access network.

**1.2** This SIN provides a specification of a signalling mechanism between network and **CDS** Terminal Equipment (TE). Appendices to this SIN contain additional technical details.

**1.3** This signalling mechanism is used to provide a range of facilities to customers. These facilities are described in Annexes to this SIN. Further facilities are planned.

**1.4** Requirements for TE intended to operate with BT's CDS™ CLI Service are contained in SIN 242[1].

**1.5** The signalling requirements in this document are based on the Bellcore CLASS signalling requirements used in the Bellcore clients' networks in North America. It should be noted that there are significant technical differences between **CDS** and CLASS. CDS was based upon the parameter set of the Bellcore Multiple Data Message Format (MDMF) as opposed to the older, more restrictive, Single Data Message Format (SDMF). The MDMF includes parameters to support delivery of both Calling Number and Calling Name services (see Note 2) whereas SDMF can support only Calling Number. The SDMF and MDMF are described in the original Bellcore documents, TR-NWT-000031 and TR-NWT-001188 (see Note 1).

**1.6 Openreach will withdraw the CDS™ Calling Line Identification (CLI) Service by the end of January 2027 in line with the closure of the BT UK PSTN.**

Note 1: BT understand that the Bellcore documents referenced above with respect to SDMF and MDMF have been re-designated by Telecordia Technologies as GR-31 LSSGR: CLASS Feature: Calling Number Delivery (FSD 01-02-1051) [9] and GR-1188 LSSGR: CLASS(SM) Feature: Calling Name Delivery Generic Requirements (FSD 01-02-1070) [10].

Note 2: BT do not currently offer a Calling Name delivery service

## 2 GLOSSARY

| | |
|---|---|
| CLASS | Custom Local Area Signaling Service |
| CLIP | Calling Line Identity Presentation |
| Down Stream | The direction of signals transmitted from the Network to TE |

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[i] **CDS** is a trademark of British Telecommunications public limited company.

| | |
|---|---|
| FSK | Frequency Shift Keying |
| Idle State | An electrical condition into which the TE is placed, when connected to the network, such that it draws minimum current and does not activate the exchange. (ETS 300 001:1997 Section 1.4.5.1)[2][ii] |
| Loop State | An electrical condition into which the TE is placed, when connected to the network, such that it draws enough current to be capable of activating the exchange. (ETS 300 001:1997, Section 1.4.5.3.)[2]. |
| PSTN | Pubic Switched Telephone Network |
| SIN | Suppliers Information Note |
| TE | Terminal Equipment |
| Up Stream | The direction of signals transmitted from TE to Network |

## 3 SIGNALLING

### 3.1 Overview

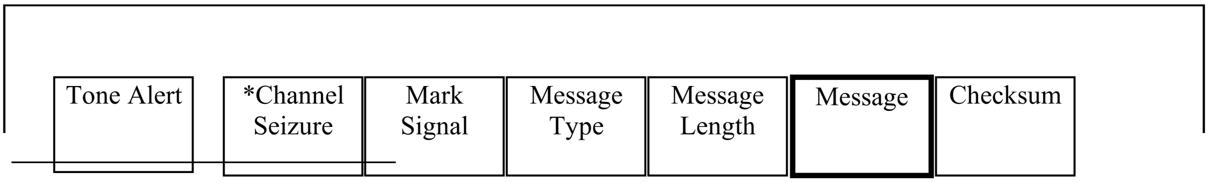
This SIN describes a Basic Mode of communication. It may be enhanced in the future.

Basic Mode communication covers transmission of data between network and TE, either before ringing is applied or without any ringing or during a call. In Basic Mode, transmission is either Down-stream (network to TE) or Up-stream (TE to network).

This specification defines four layers of communication, physical, datalink, presentation and application:

- Physical layer: defines data symbol encoding and modulation, and analogue line conditions.
- Datalink layer: defines framing of messages for transmission and a simple error check procedure.
- Presentation layer: defines how application-related information is assembled into a message.

Presentation Layer messages are contained within Datalink messages:



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[ii] The TE states described in ETS 300 001 do not fully cover the conditions established by **CDS,** however, the differences are fully described in this document.

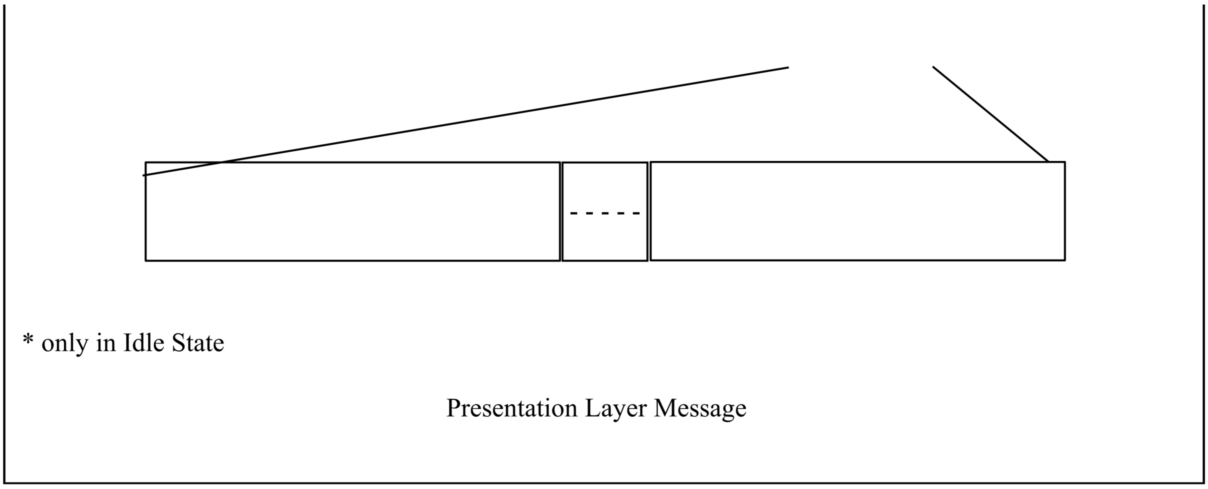

- - - - -
* only in Idle State
Presentation Layer Message

Figure 1 - Message Format

- Application layer: defines the application (such as Calling Line Identity Presentation) that uses the signalling. These are described in separate Annexes.

For architectural simplicity, only these 4 layers are defined.

The datalink layer packet is preceded by a Tone Alert Signal.

### 3.2 Signalling Specification

Signalling may occur in either the Idle State or the Loop State.

#### 3.2.1 Physical Layer

Defines data symbol encoding and modulation, and analogue line conditions.

##### 3.2.1.1 Idle State

3.2.1.1.1 Sequence of events in the Idle State.

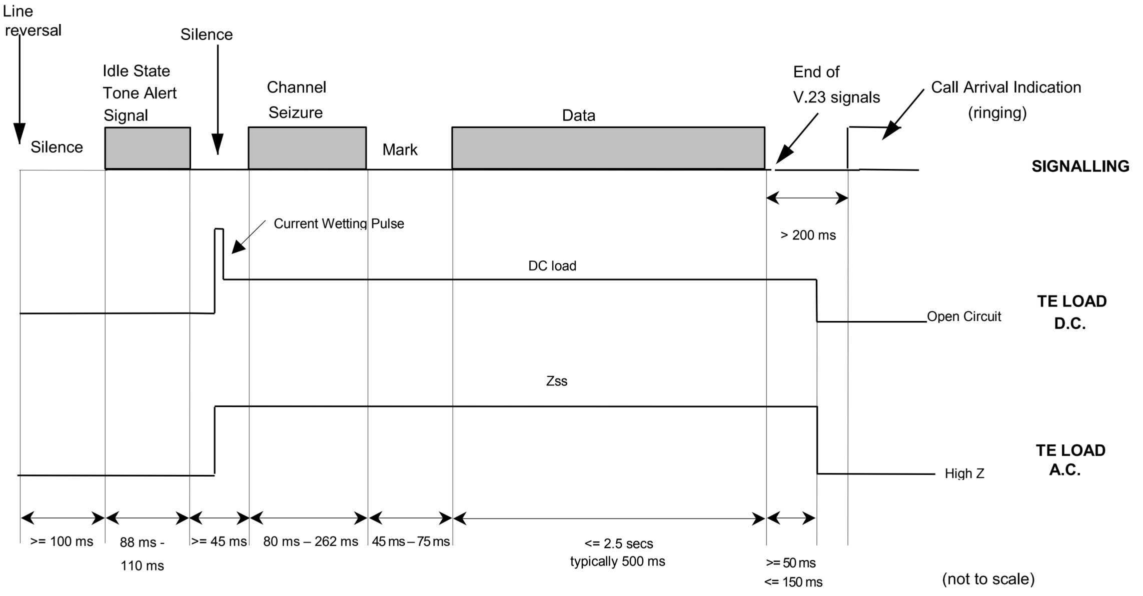

Line reversal
Silence
Idle State Tone Alert Signal
Silence
Channel Seizure
Mark
Data
End of V.23 signals
Call Arrival Indication (ringing)
SIGNALLING
> 200 ms
Current Wetting Pulse
DC load
Open Circuit
TE LOAD D.C.
Zss
High Z
TE LOAD A.C.
>= 100 ms
88 ms - 110 ms
>= 45 ms
80 ms – 262 ms
45 ms – 75 ms
<= 2.5 secs typically 500 ms
>= 50 ms <= 150 ms
(not to scale)

Figure 2 - Idle State Signalling - Sequence Of Events

An incoming CDS call is indicated by a polarity reversal on the A and B wires, usually followed by ringing current (Call Arrival Indication). Call Arrival Indication is described in more detail in SIN 351[3]. The Caller Display signalling sequence is as shown in Figure 2 and described below.

The TE responds to the Idle State Tone Alert Signal by drawing a d.c. (direct current) Wetting Pulse and applying, for a specified time, a d.c. Load, and an a.c. (alternating current) load (Zss)[4].

The d.c. Wetting Pulse is applied during the Silent Period following the end of the Idle State Tone Alert Signal.

The a.c. load shall be applied at the same time as the d.c. Wetting Pulse. It shall be removed after the end of the V.23 signals[5].

The d.c. load shall be applied and removed at the same time as the a.c. load impedance.

On removal of the d.c. and a.c. loads the TE shall revert to the Idle State as described in ETS 300 001[2].

Silent Periods.
For some applications the Channel Seizure may be delayed by up to 5 seconds. Either or both silent periods may be extended in this case.

TE Loop State.
During the above sequence, if a TE Loop State condition is detected by the Network the CDS message is ceased and the call presented as a non-CDS call.

#### 3.2.1.1.2 Line Reversal

The potential difference between the two wires of the exchange line will always be equal to or greater than 15 Volts. An incoming Caller Display message will be preceded by a polarity reversal between the two wires.

#### 3.2.1.1.3 Idle State Tone Alert Signal

Signals sent in the Idle State before ringing will be preceded by a Tone Alert Signal and a Channel Seizure signal (see 3.2.2.1). The purpose of the Tone Alert Signal is to allow more reliable detection of a Caller Display Service.

TE may recognise the Idle State Tone Alert Signal by detection of a single signal frequency (the lower frequency) or by the detection of both frequencies together. In the case of single frequency detection the validation time should be not less than 30ms. If both frequencies are detected the validation time can be reduced to not less than 20ms.

The Idle State Tone Alert Signal is:

| | |
|---|---|
| Frequencies | 2130 Hz and 2750 Hz ± 1.1% |
| Received signal level | -2 dBV to -40 dBV |
| Signal Level differential | up to 7 dB |
| a.c. and d.c. Load Impedance | a.c. Load is high impedance as required by ETS 300 001:1997, 1.4.5.1[2]<br>d.c. Load impedance is that required by ETS 300 001:1997, 1.4.5.1[2] |
| Unwanted Signals | Total power of extraneous signals in the voice band (300-3400 Hz) is at least 20 dB below the signal levels. |
| Duration | 88 to 110ms |

Table 1 - Received Characteristics of Idle State Tone Alert Signal

#### 3.2.1.1.4 D.C. Load

ETS 300 001:1997[2] requires that the total of TE on a line shall not draw in excess of 120 μA in the Idle State. However, the **CDS** TE may, as an option, draw d.c. of up to 0.5 mA per device at 50 V line voltage, but only during **CDS** Idle State signalling. At other times the conditions of ETS 300 001:1997 apply.

#### 3.2.1.1.5 D.C. Wetting Pulse

In order to improve reliability of Idle State data reception (by reducing noise), it is recommended that the TE shall draw a short pulse of current from the line by applying a resistive load for a specified time. Full details of this load, including timings, are contained in SIN 242[1].

This load must not be applied until the Idle State Tone Alert Signal has been detected.

#### 3.2.1.1.6 Down-stream Data in the Idle State

Down-stream signalling (received by TE) will be based on V.23[5] signalling.

| | |
|---|---|
| Modulation | FSK |
| Mark (logic 1) | 1300 Hz ± 1.5 % |
| Space (logic 0) | 2100 Hz ± 1.5 % |

| | |
|---|---|
| Received signal level for mark | -8 dBV to -40 dBV |
| Received signal level for space | -8 dBV to -40 dBV |
| Signal Level differential | The received signal levels may differ by up to 6dB. |
| Unwanted Signals | Total power of extraneous signals in the voice band (300-3400 Hz) is at least 20dB below the signal levels. |
| a.c. and d.c. Load Impedance | a.c. Load impedance is Zss[4]<br>d.c. Load impedance is that required in paragraph 3.2.1.1.4. & 3.2.1.1.5.<br>The timing of the application of the load impedances is described in 3.2.1.1.1 |
| Transmission rate | 1200 baud ± 1% |
| Data format | Serial binary asynchronous (1 start bit first, then 8 data bits with least significant bit first, followed by 1 stop bit minimum, up to 10 stop bits maximum). Start bit=0, Stop bit=1. |

Table 2 - Received Characteristics of V.23 Signals in Idle State

All data transmitted by the physical layer consists of 8-bit characters transmitted asynchronously preceded by one start-bit and followed by one stop-bit. At certain points in the message, a longer stop signal may be encountered. However, with the exception of the “Mark Signal” immediately following the “Channel Seizure” (see Datalink Layer) there should be no more than 10 stop-bits between characters.

Octets are constructed as follows:

$S_2$ M $B_7$ $B_6$ $B_5$ $B_4$ $B_3$ $B_2$ L $S_1$

Order of bits transmitted to line: $S_1$ first, $S_2$ last

where $S_1$ - Start Bit

$S_2$ - Stop Bit

M - Most significant bit

L - Least significant bit

$B_2$ to $B_7$ - Bit numbers 2 - 7.

Octets are transmitted to line with the most significant octet first (i.e. octets numbered 1).

#### 3.2.1.2 Loop State

3.2.1.2.1 Sequence of events in the Loop State.

The sequence of events is shown in Figure 3 (see over page).

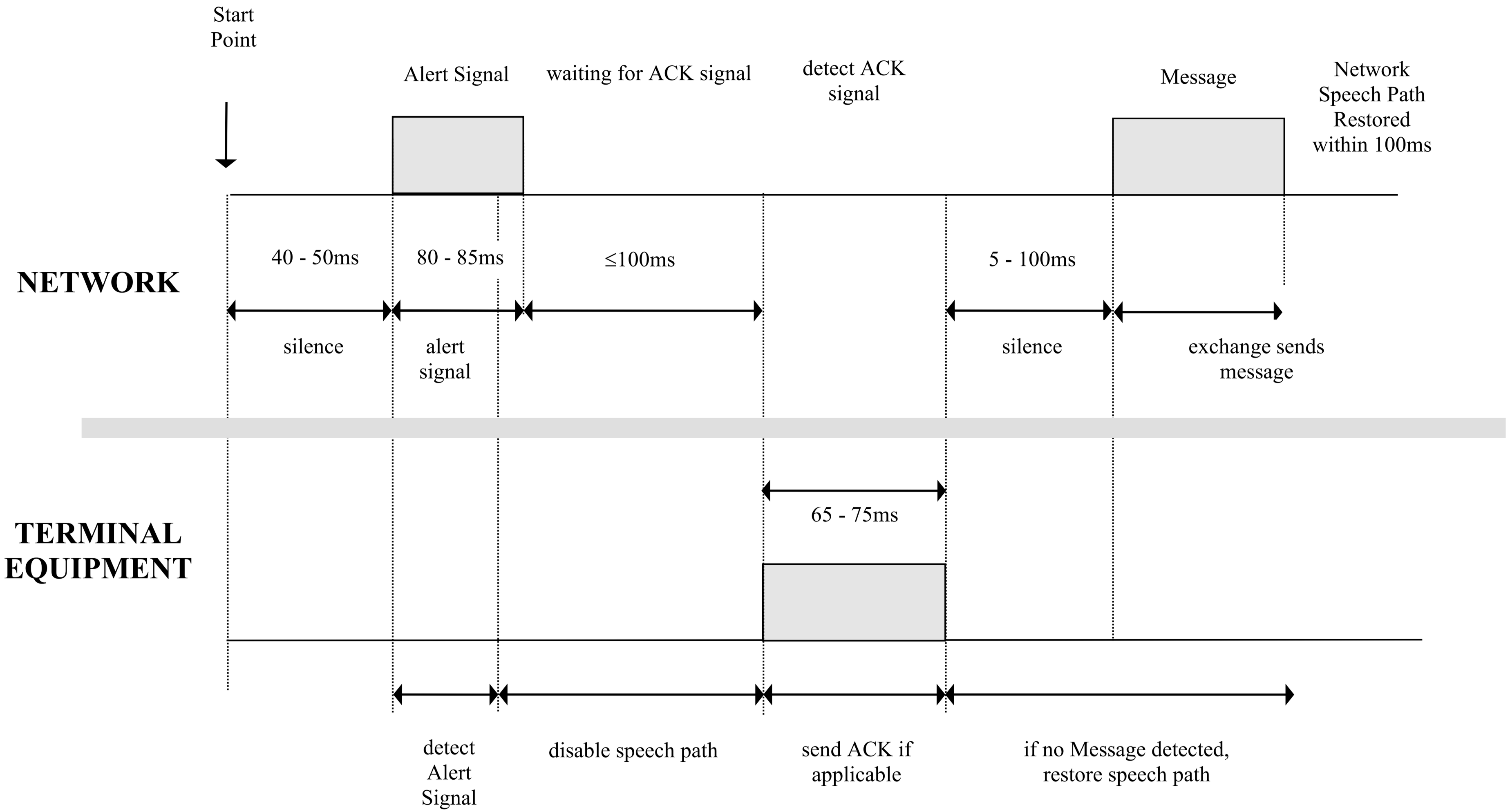

Start Point
Alert Signal
waiting for ACK signal
detect ACK signal
Message
Network Speech Path Restored within 100ms
NETWORK
40 - 50ms
80 - 85ms
≤100ms
5 - 100ms
silence
alert signal
silence
exchange sends message
TERMINAL EQUIPMENT
65 - 75ms
detect Alert Signal
disable speech path
send ACK if applicable
if no Message detected, restore speech path

Fig 3 Loop State Signalling sequence of events

The Start Point will be service dependent and will be specified in the appropriate Application Layer description in the relevant Annex to this document. As an example, for "Call Waiting" with "Caller Display" the start point is the end of the first tone ON portion of the audible Call Waiting Indication.

NOTE
**It is important to note that the audible Call Waiting tone (occurring either before or after the Caller Display Signalling) is NOT part of the Caller Display Signalling and TE should NOT attempt to recognise or detect this tone for Caller Display purposes. Other services which may be introduced in the future may have different tones or not have a tone at all.**

At this point the exchange will have already disabled the speech path to the distant customer in both directions of transmission.

The exchange will wait 40 to 50ms from the Start Point, then send the Alert signal.

TE will detect the Alert signal and respond by

1. first checking that no other TE, on the same line, are in the Off-hook state,
2. and then by disabling the speech path in both directions, and
3. sending an Acknowledge (ACK) signal.

This must not be sent before the Alert signal has ceased but must commence within 100ms of the end of the Alert signal.

Note: It may be convenient for TE to constantly monitor the line for other TE in the Off-hook state.

The ACK shall be 65 - 75ms in duration.

The exchange will detect the ACK and respond by sending the Message. The Message will commence between 5 and 100ms from the end of the ACK.

After the complete Message has been sent the exchange will restore the speech path within 100ms.

If the TE does not detect the beginning of the Message within 200ms of the end of sending the ACK it will abandon the signalling and reconnect the speech path.

#### 3.2.1.2.2 Loop State Tone Alert Signal

Signals sent in the Loop State will be preceded by a Tone Alert Signal. The purpose of the Tone Alert Signal is to indicate to the terminal equipment that a Caller Display Service message is ready to be transmitted.

TE must recognise the Loop State Tone Alert Signal by the detection of both frequencies together. The validation time should be not less than 20ms.

The Loop State Tone Alert signal is:

| | |
|---|---|
| Frequencies | 2130 Hz and 2750 Hz ± 0.6% |
| Received signal level | -2 dBV to -40 dBV |
| Signal Level differential | up to 7 dB |
| a.c. and d.c. Load Impedance | d.c. - ETS 300 001:1997 Section 2.3[2]<br>Alternatively, NV NTR Issue 2 section 4[6].<br>a.c. - ETS 300 001:1997 Section 4.1.2[2]<br>Alternatively, NV NTR Issue 2 section 5[6]. |
| Unwanted Signals | Total power of extraneous signals in the voice band (300-3400 Hz) is at least 20 dB below the signal levels. |
| Duration | 80 to 85ms |

Table 3 - Received Characteristics of Loop State Alert Signal

#### 3.2.1.2.3 Terminal Equipment Acknowledge Signal (ACK)

The Terminal equipment will detect the Alert Tone and respond by sending the Acknowledge Signal (ACK). This signal is the Dual Tone Multi Frequency (DTMF) Digit 'D' [7].

### 3.2.1.2.4 Down-stream Data - Loop state

Down-stream signalling (received by TE) will be based on V.23[5] signalling.

| | |
|---|---|
| Modulation | FSK |
| Mark (logic 1) | 1300 Hz ± 1.5 % |
| Space (logic 0) | 2100 Hz ± 1.5 % |
| Received signal level for mark | -8 dBV to -40 dBV |
| Received signal level for space | -8 dBV to -40 dBV |
| Signal Level differential | The received signal levels may differ by up to 6 dB. |
| Unwanted Signals | Total power of extraneous signals in the voice band (300-3400 Hz) is at least 20 dB below the signal levels. |
| a.c. and d.c. Load Impedance | d.c. - ETS 300 001:1997 Section 2.3[2]<br>Alternatively, NV NTR Issue 2 section 4[6].<br>a.c. - ETS 300 001:1997 Section 4.1.2[2]<br>Alternatively, NV NTR Issue 2 section 5[6]. |
| Transmission Rate | 1200 baud ± 1% |
| Data format | Serial binary asynchronous (1 start bit first, then 8 data bits with least significant bit first, followed by 1 stop bit minimum, up to 10 stop bits maximum). Start bit 0, stop bit 1. |

Table 4 - Received Characteristics of V.23 Signals in Loop State

All data transmitted by the physical layer consists of 8-bit characters transmitted asynchronously preceded by one start-bit and followed by one stop-bit. At certain points in the message, a longer stop signal may be encountered. However, with the exception of the “Mark Signal” immediately following the “Channel Seizure” (see Datalink Layer) there should be no more than 10 stop-bits between characters.

Octets are constructed as follows:

$S_2$ M $B_7$ $B_6$ $B_5$ $B_4$ $B_3$ $B_2$ L $S_1$

Order of bits transmitted to line: $S_1$ first, $S_2$ last

where $S_1$ - Start Bit

$S_2$ - Stop Bit

M - Most significant bit

L - Least significant bit

$B_2$ to $B_7$ - Bit numbers 2 - 7.

Octets are transmitted to line with the most significant octet first (i.e. octets numbered 1).

### 3.2.2 Datalink Layer(Basic Mode)

The datalink layer provides framing of data into packets that can be distinguished from noise, and with error detection in the form of a checksum.

Re transmission of messages is not supported at the datalink layer.

The following figure shows the format of a datalink packet.

| * Channel seizure | Mark signal | Message type | Message length | Message | Checksum |
|---|---|---|---|---|---|

Figure 4 - Datalink packet format

These fields are sent in order, starting with the Channel Seizure*, and finishing with the Checksum.

#### 3.2.2.1 Channel Seizure (see fig 1)

* Channel seizure is not sent in Loop State

The Channel Seizure consists of a continuous sequence of alternate 0 and 1 bits at 1200 bits/s. The purpose of Channel Seizure is to minimise the possibility of noise mimicking a genuine carrier.

The length of Channel Seizure as seen by TE is at least 96 bits (80ms). However Channel Seizure may be longer: up to 315 bits (262ms).

#### 3.2.2.2 Mark Signal

The mark signal seen by the TE is at least 55 bits (45ms) of continuous mark condition (equivalent to a series of stop bits, or no data being transmitted).

### 3.2.2.3 Message Type

The message type is a single binary byte. The value depends on the application (to be defined in the appropriate Service Definitions).

### 3.2.2.4 Message Length

The message length is a single binary byte indicating the number of bytes in the message (not including the Message Type, Message Length or Checksum bytes). This allows a message of between 0 and 255 bytes.

### 3.2.2.5 Message

The message consists of between 0 and 255 bytes, according to the Message Length. This is the presentation layer message described below. Any 8-bit value may be sent in the message bytes, depending on the requirements of the presentation layer and the application.

### 3.2.2.6 Checksum

The checksum consists of a single byte equal to the two's complement sum of all bytes starting from the "message type" word up to the end of the message block (excluding the transmitted checksum). Carry from the most significant bit is ignored.

The receiver must compute the 8 bit sum of all bytes starting from the "message type" and including the checksum. Carry from the most significant bit is ignored. The result of this addition must be zero or the message must be assumed to be corrupt.

Note that a checksum is chosen for computational ease and cannot detect all errors.

Example:

Checksum calculation within the network.

| | | |
|---|---|---|
| Total of bytes | 10011100 | (carries from the msb* are disregarded) |
| Complement | 01100011 | |
| 2s Complement | 01100100 | |

* most significant bit.

It is the twos complement that is transmitted as the checksum.

Checksum verification by TE.

| | | |
|---|---|---|
| Total of bytes | 10011100 | (carries from the msb are disregarded) |
| Received Checksum | 01100100 | |
| Addition | 1 00000000 | (carries from the msb are disregarded) |

A mark signal will continue for at least 2 bits after the end of the checksum.

### 3.2.3 Presentation Layer

This section covers Basic Mode down-stream signalling. Up-stream signalling and Enhanced Mode are for further study.

The presentation layer assembles application-related information into data parameters. The following figure shows the format of a presentation layer message.

| | | | | | |
|---|---|---|---|---|---|
| Parameter type | Parameter length | Parameter byte(s) | Parameter type | Parameter length | Parameter byte(s) |

Figure 5- Presentation Layer Message format

The three fields Parameter Type, Parameter Length and Parameter Byte(s) together comprise one presentation layer parameter, and may be repeated. For each parameter, the Parameter Type is sent first, followed by the Parameter Length, and finally the Parameter bytes (if any).

Parameter Type

The Parameter Type is a single binary byte giving the type of the parameter. The value depends on the application (to be defined in the appropriate Service Definitions).

Parameter Length

The Parameter length is a single binary byte giving the length of the parameter. The value is between 0 and 255. In Basic Mode, a complete message must be contained within a single datalink packet. Therefore the total length of presentation layer parameters (including all parameter type and length bytes) must not exceed 255 bytes.

Parameter Byte(s)

Zero or more bytes of application-related information, the number depending on the Parameter Length. The information contained in the Parameter Bytes depends on the application but should in general be encoded in BT ISDN Character Set IA5[8] (even where numeric information such as a telephone number is conveyed). All 8 bits of each byte are relevant, and any 8-bit value may be sent, depending on the requirements of the application.

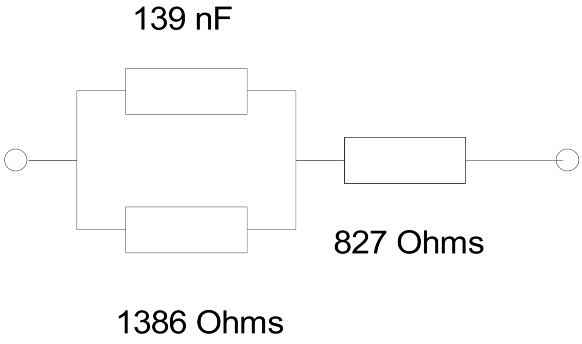
## 4. References

1. SIN 242 - Calling Line Identification Service, Part 1 Idle State, Down Stream Signalling, Part 2 Loop State Signalling.

2. ETS 300 001 - European Telecommunication Standard Attachments to Public Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN

3. SIN 351 - Openreach Public Switched Telephone Network (PSTN): Technical Characteristics Of The Single Analogue Line Interface.

4. Zss. A complex impedance nominally represented by the following network:



5. ITU-T Recommendation V.23 - 600/1200-baud modem standardized for use in the general switched telephone network

6. BABT Doc. NV NTR Issue 2. UK Non-Voice National Technical Requirement

7. ITU-T Recommendation Q.23 - Technical Features of Push-Button Telephone Sets

8. BT ISDN IA5 character set. This is CCITT V.3 with character 2/4 ($) replaced by “£”. This is a 7-bit code, but within CLIP messages is sent as 8 bits, with the most significant bit set to zero. Non-displayable characters (with codes 0 to 31 decimal) are not used. The specification for BT IA5 is given in Appendix 1.

9. GR-31 LSSGR: CLASS Feature: Calling Number Delivery (FSD 01-02-1051) published by Telecordia Technologies

10. GR-1188 LSSGR: CLASS(SM) Feature: Calling Name Delivery Generic Requirements (FSD 01-02-1070) published by Telecordia Technologies

For information on obtaining documents referenced by SINs, please see the documents sources page at http://www.sinet.bt.com/usenum.htm#docsources.

## 5. HISTORY

| ISSUE | DATE | CHANGES |
|---|---|---|
| Issue 1 | June 1993 | |
| Issue 2 | April 1996 | Includes Loop State Signalling |
| Issue 3 | November 1997 | 3.2.1.2.1 (Start Point) Note added. |
| Issue 3.1 | April 2001 | Editorial changes. |
| Issue 3.2 | April 2002 | Editorial changes. |
| Issue 3.3 | March 2003 | Editorial changes. Reference to SIN 242 added. |
| Issue 3.4 | June 2004 | Editorial changes. |
| Issue 3.5 | October 2008 | Clarification in Section 1.5 on compatibility with Bellcore CLASS specifications |
| Issue 3.6 | February 2013 | Editorial changes |
| Issue 3.7 | September 2015 | Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/ |
| Issue 3.8 | November 2018 | References to ETS 300 001 throughout the document changed to refer to the 1997 version of the standard |
| Issue 3.9 | August 2020 | Changes to the document to reflect Openreach branding. New Openreach sin sit and sin email contact address |
| Issue 3.9 | August 2021 | Annual Review – no changes required – issue remains unchanged. |
| Issue 3.9 | August 2022 | Annual Review – branding and font changes only – issue remains unchanged. |
| Issue 3.9 | September 2023 | Annual Review – branding and font changes only – issue remains unchanged. |
| Issue 3.10 | November 2024 | Service withdrawal notification added to Section 1. Glossary section also updated. |

END

## SIN 227 Appendix 1

## ALPHA-NUMERIC CHARACTER SET (IA5)

### GENERAL

Alpha-numeric characters in messages exchanged with the TE shall be coded as in TABLE 1, which differs from CCITT Recommendation V.3 by using the bit combination of position 2/4 to represent the £ (pound sign). In all other respects, TABLE 1 accords with CCITT Recommendation V.3 with the permissible option of using position 2/3 for # (number sign).

The following abbreviations are used in TABLE 1:

| | |
|---|---|
| BEL | Bell |
| CAN | Cancel |
| DC | Device Control |
| DEL | Delete |
| EM | End of Medium |
| ESC | Escape |
| FE | Format Effectors |
| IS | Information Separator |
| NUL | Null |
| SI | Shift-In |
| SO | Shift-Out |
| SP | Space |
| SUB | Substitute Character |
| TC | Transmission Control |

NOTE 1 : The significance of the following graphic characters is given below:

| Position (Column/row) | Significance |
|---|---|
| 2/2 | Quotation Mark |
| 2/7 | Apostrophe |
| 2/12 | Comma |
| 5/14 | Upward Arrow Head |
| 5/15 | Underline |
| 6/0 | Grave Accent |
| 7/14 | Tilde |

NOTE 2 : The control characters in columns 0 and 1 and DEL in column 7, row 15 are not used.

## TABLE 1: CHARACTER CODING - BT ISDN VERSION

| B | b7 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| I | | | | | | | | | |
| T | b6 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| S | | | | | | | | | |
| | b5 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| BITS<br>b b b b<br>4 3 2 1 | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 0 0 0 | 0 | NUL | TC7 | SP | 0 | @ | P | ` | p |
| 0 0 0 1 | 1 | TC1 | DC1 | ! | 1 | A | Q | a | q |
| 0 0 1 0 | 2 | TC2 | DC2 | " | 2 | B | R | b | r |
| 0 0 1 1 | 3 | TC3 | DC3 | # | 3 | C | S | c | s |
| 0 1 0 0 | 4 | TC4 | DC4 | £ | 4 | D | T | d | t |
| 0 1 0 1 | 5 | TC5 | TC8 | % | 5 | E | U | e | u |
| 0 1 1 0 | 6 | TC6 | TC9 | & | 6 | F | V | f | v |
| 0 1 1 1 | 7 | BEL | TC10 | ' | 7 | G | W | g | w |
| 1 0 0 0 | 8 | FE0 | CAN | ( | 8 | H | X | h | x |
| 1 0 0 1 | 9 | FE1 | EM | ) | 9 | I | Y | i | y |
| 1 0 1 0 | 10 | FE2 | SUB | * | : | J | Z | j | z |
| 1 0 1 1 | 11 | FE3 | ESC | + | ; | K | [ | k | { |
| 1 1 0 0 | 12 | FE4 | IS4 | , | < | L | \ | 1 | \| |
| 1 1 0 1 | 13 | FE5 | IS3 | - | = | M | ] | m | } |
| 1 1 1 0 | 14 | SO | IS2 | . | > | N | ^ | n | ~ |
| 1 1 1 1 | 15 | SI | IS1 | / | ? | O | _ | o | DEL |

## SIN 227 ANNEX A

## CALLING LINE IDENTIFICATION PRESENTATION (CLIP)

## CONTENTS

A.1 Overview

A.2 Message Format

A.3 Message Timing

A.4 Requirements for CLIP parameters

A.5 Message Length

A.6 Message Structure Example

### A.1 Overview

Calling Line Identity Presentation (CLIP) provides for the delivery of the identity of the caller when a telephone call arrives, before the start of ringing. The service will initially offer caller number using signalling in an Idle State mode.[iii] [iv]

When CLIP is provided on a line, and is active, then a CLIP message will be delivered with every incoming call. Where the caller's name or number is not delivered, then the reason for non-delivery will be indicated (currently there are two possibilities: name or number not available, and name or number withheld by the caller). Text messages generated by the network may also be sent.

In addition to caller identity, the CLIP Service also delivers the time and date, and may also provide an indication of call type. For other services the time and date may not be the current time and date. The time may be used to set clocks in TE.

DISPLAY CALLER WITHHELD

Callers may have legitimate reasons for withholding their CLI from the called party. At the same time as the introduction of the Caller Display Service, BT introduced a corresponding service that allows callers to withhold CLI on a per call basis. This service to withhold CLI is activated by the caller dialling the prefix digits 141 in front of the number to be called. Use of this 141 prefix will result in the call being marked "private" within the (BT) network . The "CLI Withheld" parameter will be sent as a reason for the absence of CLI as the caller display message.

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[iii] The service may be enhanced later to deliver caller name.

[iv] Other enhancements are planned to include CLIP during the Loop State to extend the caller waiting service. (see SIN227, Annex B)

As an extension to the 141 service, in some instances it will be necessary to provide the CLI Withheld Service for all calls from a particular line. In this case CLI will be withheld for all calls and there will be no need to prefix each call with 141. CLI can be sent on a per call basis in this instance by dialling the prefix 1470.

141 AND THE IMPACT ON TE

It is important that TE should support the prefix 141 for customers wishing to withhold their CLI. TE suppliers should note that chargeable calls could start with the prefix 141. This could affect payphones, call-logging equipment, call barring equipment and possibly private network numbering schemes.

The digits 141 will be treated as a service activation code and absorbed at the local exchange. There will be no second dial tone or confirmation to the caller after 141. The caller will be able to dial the rest of the call in the normal way immediately after 141. Onwards routing on the basis of the remaining digits will take place as usual and provide access to other operators using their normal access codes.

MALICIOUS CALL TRACE

The use of 141 will not prevent operation of the malicious call trace capability of the network. The malicious call trace is a network operator function.

### A.2 Message Format

This section does not define how TE should process, store or display information contained within the messages.

The signalling system can deliver up to 255 bytes for the Presentation layer packet. This is currently a maximum of 64 bytes for CLIP. This excludes datalink overhead Caller Display Service such as Channel Seizure, Mark Signal, Message Type and Length and Checksum.

The Message Type for CLIP is binary 10000000, indicating “Supplementary Information Message”. Other message types may be used for other purposes.

There are eight parameter types associated with CLIP:

| **Parameter Type value** | **Parameter name** |
|---|---|
| 00010001 | Call Type |
| 00000001 | Time & date |
| 00000010 | *Calling* line directory number (DN) |
| 00000011 | *Called* directory number |
| 00000100 | Reason for absence of DN |
| 00000111 | Caller name/Text |
| 00001000 | Reason for absence of name |
| 00010011 | Network Message System Status |

Table 1, Annex A - Parameter Types

The “Calling line directory number” is the number of the line from which the call was made, or a substitute presentation number. The “Called directory number” is the number that was called. The latter is of significance when the call has been diverted, or for whatever reason the number called may not be the same as the number to which the call is connected.

There may be parameters of other types present. The Call Type parameter, if present, will always be sent first. Other parameters may be sent in any order. Any parameters defined in future will be sent after these eight, to allow TE makers to define buffer lengths long enough only for these CLIP parameters defined here. Parameters of unrecognised type should be ignored.

At least seven of the eight must be recognised for the CLIP service (TE is not required to recognise called directory number when the service is launched). The call type parameter, if present will always be sent first. Other parameters may be sent in any order. (Parameters defined in the future will always be sent after those defined here, that is later in sequence).

Not all parameters may be sent on all occasions.

Parameters may be sent with zero length. In such cases Parameter Type and Parameter Length will still be sent. Parameter Length will zero and the checksum will be correct. (See A.2.1.).

Unless otherwise indicated, parameters shall be encoded in IA5[8]. The version used is a 7-bit code, and will be sent in 8-bit bytes with the most significant bit set to zero. Non-displayable characters (with codes 0 to 31 decimal) are not used.

In the following tables of parameter encoding, for each parameter byte number 1 is sent first, followed by byte 2, and so on until the last byte has been transmitted.

### A.2.1 Call Type Parameter

The Call Type parameter is encoded as follows:

| **Byte number** | **Contents** |
|---|---|
| 1 | Call Type parameter type code (00010001) |
| 2 | Parameter length |
| 3 | Call type |

Table 2, Annex A - "Call Type" Parameters

Additional information may be sent after byte 3 in future. In that case byte 2 (Parameter length) will be more than 1.

| **Call Type encoding** | **Call type** |
|---|---|
| 00000001 | Voice call |
| 00000010 | ring-back-when-free call |
| 10000001 | message waiting call |

Table 3, Annex A - "Call Type" Encoding

Future services may require other Call Type encoding values.

If the Call Type parameter is omitted, then the call type is “Voice Call” by default. Additional Call Types may be defined later. Other Call Types such as FAX, will be used when they are available.

The “Message Waiting” call type is used to give an indication of a new message from a specific caller. The Calling Line Directory Number and Caller Name/Text (if present) may indicate the number and name of the person who left a message, or may indicate the name and number of the message service.

### A.2.2 Time & Date Parameter

The Time Parameter indicates the date and time (accurate to within ± 1 minute) of the event associated with the "Supplementary Information Message". Where the Call Type has a value 127 (binary 01111111) or less, then the time can be assumed to be the current time, and may be used to set internal TE clocks and calendars. For a call of type "message waiting" the date and time refer to the time when a message was left or recovered. For other call types with value 128 (binary 10000000) or greater, the time and date may relate to some unspecified event, not necessarily current time.

The time parameter is encoded as follows:

| Byte number | Contents |
|---|---|
| 1 | Time & Date parameter type code (00000001) |
| 2 | Parameter length (8) |
| 3<br>4 | Month |
| 5<br>6 | Day |
| 7<br>8 | Hours |
| 9<br>10 | Minutes |

Table 4, Annex A - Time Parameter

All parameter bytes (bytes 3 to 10) shall be encoded in BT IA5, 8 bits with no parity. The encoded time shall be accurate to the nearest minute.

The "Month" field shall be encoded as two BT IA5 characters, 01 for January, 02 for February and so on until 12 for December.

The "Day" field shall be encoded as two BT IA5 characters, 01 to 31.

The "Hours" field shall be encoded in local 24-hour time as two BT IA5 characters 00 to 23.

The "Minutes" field shall be encoded as two BT IA5 characters, 00 to 59.

For each of the values Month, Day, Hours and Minutes, the most significant digit is the first (lower numbered) byte. For example, if the Month value is 12, then byte 3 contains the BT IA5 code for "1" and byte 4 contains the BT IA5 code for "2".

### A.2.3 Calling Line Directory Number Parameter

The Calling Line Directory Number parameter is encoded as follows:

| **Byte number** | **Contents** |
|---|---|
| 1 | Calling Line Directory Number parameter type code (00000010) |
| 2 | Parameter length (*n*) |
| 3 | First digit |
| 4 | Second digit |
| . | . |
| . | . |
| *n* + 2 | *n*th digit |

Table 5, Annex A - Calling Line Directory Number Parameter

The digits are encoded in BT IA5 (8 bit, no parity). The maximum length of number sent is 18 characters. The first digit of the number is sent in byte 3. For example, if the Calling Line Directory Number is "0171 250 7423", then the BT IA5 code for the digit "0" is sent in byte 3, and the BT IA5 code for "3" (the final digit) is sent in byte 15 (note that in this example two spaces are included in the number). The Calling Line Directory Number is a telephone number that may be used to call back the caller (or the same service). It may not be the directory number of the originating call; for example, it could be an 0800 number associated with the caller. Where an alternative to the directory number of the caller is sent, this is referred to as a *Presentation Number*[v].

The digits may be interspersed with BT IA5-encoded punctuation characters "space" and "-".

Where only an incomplete number is known, then a partial number may be sent. This will be followed by the character "-" for example, where a call comes from outside the digital network, the area code may still be known, and sent as:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 7 | 1 | - | 2 | 5 | 0 | - |

or for an international call from France:

---

[v] In most cases the Calling Number *will* be the directory number of the calling line, rather than a presentation number. The receiver of the call will have no indication of when it is otherwise. : There may be a need in future to be able to send both directory and presentation number, or to indicate which has been sent.

| | | | | | |
|---|---|---|---|---|---|
| 0 | 0 | | 3 | 3 | - |

### A.2.4 Reason for Absence of DN Parameter

The Reason for Absence of DN parameter is encoded as follows:

| Byte number | Contents |
|---|---|
| 1 | Reason for Absence of DN parameter type code (00000100) |
| 2 | Parameter length (1) |
| 3 | Reason |

Table 6 , Annex A - Reason for Absence of DN Parameter

The Reason is encoded in a BT IA5 character (8 bit, no parity). The Reason will be one of the following BT IA5-encoded values:

- “P” - “Number Withheld”: the caller has withheld delivery of number.
- “O” - “Number Unavailable”: the number is not available.

Other codes might be sent in future. This parameter will not be sent when the Calling Line Directory Number parameter is sent. This parameter gives a reason for the absence of the *Calling* Line DN parameter, not the *Called* DN parameter. If the latter parameter is absent, no explanation is given.

### A.2.5 Called Directory Number Parameter

The Called Directory Number parameter is encoded as follows:

| Byte number | Contents |
|---|---|
| 1 | Called Directory Number parameter type code (00000011) |
| 2 | Parameter length (*n*) |
| 3 | First digit |
| 4 | Second digit |
| . | . |
| . | . |
| *n* + 2 | *n*th digit |

Table 7, Annex A - Called Directory Number Parameter

The digits are encoded in BT IA5 (8 bit, no parity). The maximum length of number sent is 18 characters. The first digit of the number is sent in byte 3. The Called Directory Number is the telephone number used by the caller when making the call. The syntax and format are as for Calling Line Directory Number.

If the *Called* DN parameter is absent, no explanation is given.

### A.2.6 Caller Name/Text Parameter

The Caller Name/Text parameter is encoded as follows:

| **Byte number** | **Contents** |
|---|---|
| 1 | Caller Name/Text parameter type code (00000111) |
| 2 | Parameter length (*n*) |
| 3 | First character of name/text |
| 4 | Second character of name/text |
| . | . |
| . | . |
| *n* + 2 | *n*th character of name/text |

Table 8, Annex A - Caller Name/Text Parameter

The characters are encoded in BT IA5 (8 bit, no parity). The characters are sent in left to right order. For example, if the name is "Simon Jones", then the letter "S" is sent in byte 3, "i" in byte 4, and so on.

The Name/Text shall consist of between 1 and 20 BT IA5 characters. Any displayable upper or lower case BT IA5 character may be included. The Caller Name/Text parameter may be used for text information other than the caller's name when no name is available.

The Caller Name/Text parameter is, if available, the name of the person calling, where this can be distinguished from the directory name associated with the calling line. The Caller Name/Text parameter may also be used for other information when the name is not available, for example "Payphone" or "International" or "Ring-back call".

It is intended that this information will complement the Call Type Parameter (A.2.1). In cases where TE is not able to recognise the Call Type Parameter the information is intended to assist the user and TE should not attempt recognition.

In cases where TE can recognise the Call Type Parameter then this takes priority over the Caller Name/Text Parameter.

### A.2.7 Reason for Absence of Name Parameter

The Reason for Absence of Name parameter is encoded as follows:

| Byte number | Contents |
|---|---|
| 1 | Reason for Absence of Name parameter type code (00001000) |
| 2 | Parameter length (1) |
| 3 | Reason |

Table 9, Annex A - Reason for Absence of Name Parameter

The Reason is encoded in a BT IA5 character (8 bit, no parity).

The Reason will be one of the following BT IA5-encoded values:

- "P" - "Name withheld": the caller has withheld delivery of name..
- "O" - "Name Unavailable": the name is not available.

This parameter may be sent when the Caller Name/Text parameter is also sent. This might occur when the Caller Name/Text field is being used to carry information other than the caller's name.

Other codes might be sent in future. This parameter will not be sent if the caller-name service is not available.

### A.2.8 Network Message System Status

The Network Message System Status parameter is encoded as follows:

| Byte number | Contents |
|---|---|
| 1 | Network Message System Status parameter type code (00010011) |
| 2 | Parameter length (1) |
| 3 | Network Message System Status |

Table 10, Annex A - Network Message System Status

The value of the Network message System Status byte is a *binary* encoded value indicating the number of messages waiting in the message system. The value zero means no messages, the value 1 means 1 or an unspecified number of messages waiting, other values (up to 255) indicate that number of messages waiting.

This parameter is not necessarily associated with a normal phone call, and will probably be sent as a “no-ring” call.

Unless a Call Type parameter is also sent, then any time parameter sent with the Network Message System Status parameter will indicate current clock time (not the time a message was deposited or recovered). This is to enable the TE to assume that the time is current time (and set its internal clock) where no Call Type parameter is sent.

### A.3 CLIP Message Timing

Idle State CLIP signalling will be sent once (and only once) following the d.c. line polarity reversal that indicates an incoming call. It will be sent before the first burst of ring current. (see Figure 1, Annex A - CLIP message timing)

Additional messages may be sent before ringing.

TE may recognise the Idle State Tone Alert Signal by detection of a single frequency  or by the detection of both frequencies together. In the case of single frequency detection the validation time should be not less than 30ms. If both frequencies are detected the validation time can be reduced to not less than 20ms.

### A.4 Requirements for CLIP Parameters

This subsection identifies some requirements for sending CLIP parameters. Each parameter type, if present in a CLIP message, will appear once. The Call Type parameter may be present, to indicate the type of call, for example message waiting. If the Call Type parameter is not present, the call type is “Voice Call”. If sent, the Call Type parameter must be the first parameter. This is to allow TE to identify and ignore call types that need not be stored (and which might have messages that exceed the length used for CLIP). The time & date parameter may be present in any CLIP messages (but does not always indicate the current date and time: this depends on the call type).

For message waiting calls the same parameters may be sent, and in addition Network Message System Status may be sent. The Time parameter should reflect the time when the message was deposited.

The Network Message System Status parameter, if present, will indicate information related to messaging, such as the number of messages waiting. Network Message System Status may be sent on its own, or with or without Time. It will be sent with Call Type, Calling DN, Caller Name/Text or Reason for absence of number/name only when the Call Type is “message waiting”.

If new call types are defined, where the call type value is below 128 (binary 10000000) then the TE is entitled to assume these to be broadly similar to "Voice", and to process Time & date, number name/text, reason for absence and network message system status parameters as for "Voice" call type.

Other call types (yet to be defined) of Call Type value of 128 (binary 10000000) and above may use additional parameters and existing parameter types may have different meanings.

## A.5 Message Length

The longest CLIP message (excluding datalink layer information) is currently 64 bytes. This length is expected for call types “Voice”, “Ring-back-when-free”, “Message Waiting”. However, in future there may be additional parameters that could extend the message length, but these additional parameters will be sent *after* the message sequence (i.e. the parameters: Call Type, caller number, name/text, reason for absence of name or number and Network Message System Status) but *before* the checksum.

Other call types (yet to be defined) of Call Type value of 128 (binary 10000000) and above may use additional parameters and may result in longer messages.

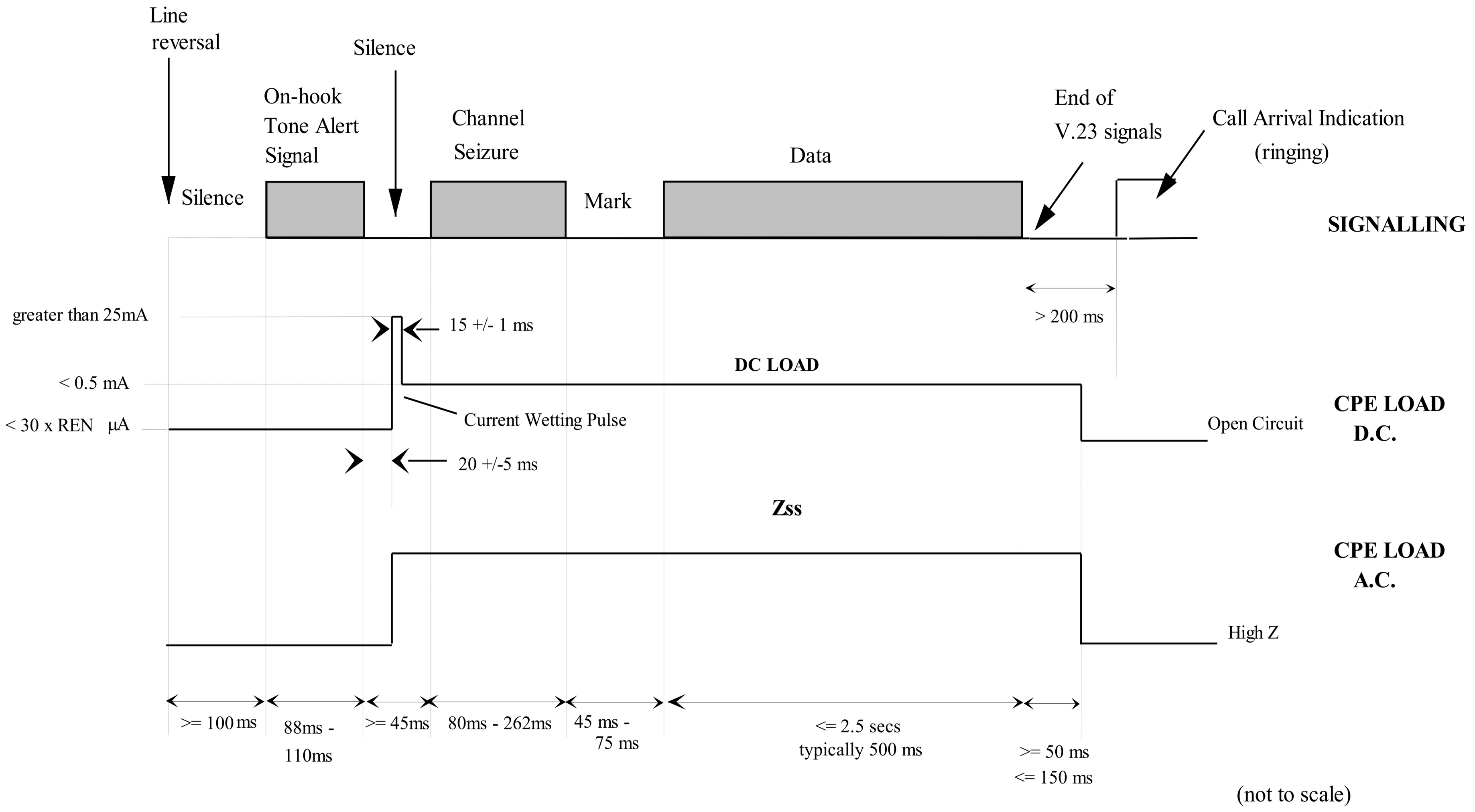
Line reversal
Silence
On-hook Tone Alert Signal
Silence
Channel Seizure
Mark
Data
End of V.23 signals
Call Arrival Indication (ringing)
SIGNALLING
> 200 ms
greater than 25mA
15 +/- 1 ms
DC LOAD
< 0.5 mA
Current Wetting Pulse
< 30 x REN µA
Open Circuit
CPE LOAD D.C.
20 +/-5 ms
Zss
CPE LOAD A.C.
High Z
>= 100 ms
88ms - 110ms
>= 45ms
80ms - 262ms
45 ms - 75 ms
<= 2.5 secs typically 500 ms
>= 50 ms <= 150 ms
(not to scale)

Figure 1, Annex A - CLIP Message Timing

## A.6 Message Structure Example

| | | | |
|---|---|---|---|
| Msg type | 10000000 | CLIP | |
| Msg length | 00010101 | 21 bytes | |
| Parameter | 00000001 | Time & Date | |
| Parameter length | 00001000 | 8 bytes | |
| Parameters | 00110000 | IA5 0 | |
| Parameters | 00110011 | IA5 3 | |
| Parameters | 00110001 | IA5 1 | |
| Parameters | 00110101 | IA5 5 | |
| Parameters | 00110001 | IA5 1 | |
| Parameters | 00110000 | IA5 0 | |
| Parameters | 00110011 | IA5 3 | |
| Parameters | 00110000 | IA5 0 | |
| | | | 15th March 10:30 am |

| | | | |
|---|---|---|---|
| Parameter | 00000010 | Number | |
| Parameter length | 00001001 | 8 bytes | |
| Parameters | 00110000 | IA5 0 | |
| Parameters | 00110011 | IA5 3 | |
| Parameters | 00110101 | IA5 5 | |
| Parameters | 00110001 | IA5 1 | |
| Parameters | 00101101 | IA5 - | |
| Parameters | 00110011 | IA5 3 | |
| Parameters | 00110010 | IA5 2 | |
| Parameters | 00110001 | IA5 1 | |
| Parameters | 00110000 | IA5 0 | |
| Checksum | 00001110 | | Number:- 0351-3210 |

# SIN 227 ANNEX B

# CALLING LINE IDENTITY PRESENTATION WITH CALL WAITING

## CONTENTS

B.1 Overview

B.2 Message Format

B.3 Message Timing

B.4 Requirements for parameters

B.5 Message Length

B.6 Message Structure Example

## B.1 Overview

Calling Line Identity Presentation (CLIP) can be combined with Call Waiting (CW) to provide delivery of the identity of the caller when a second telephone call arrives during an existing call. The service will initially offer caller number[vi] using signalling in the Loop State mode.

When CLIP and Call Waiting are provided on a line and are active then a CLIP message will be delivered with every incoming call.

Where Call Waiting is de-activated and therefore no second call is presented, CLIP in the Idle State will not be affected.

Where the caller's name or number is not delivered, then the reason for non-delivery will be indicated (currently there are two possibilities: name or number not available, and name or number withheld by the caller). Text messages generated by the network may also be sent.

In addition to caller identity, the CLIP Service also delivers the time and date, and (optionally) an indication of call type. The time may be used to set clocks in TE. For other services the time and date may not be the current time and date.

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[vi] The service may be enhanced later to deliver caller name.

DISPLAY CALLER WITHHELD

Callers may have legitimate reasons for withholding their CLI from the called party. At the same time as the introduction of the Caller Display Service, BT introduced a corresponding service that allows callers to withhold CLI on a per call basis. This service to withhold CLI is activated by the caller dialling the prefix digits 141 in front of the number to be called. Use of this 141 prefix will result in the call being marked "private" within the (BT) network. The "CLI Withheld" parameter will be sent as a reason for the absence of CLI as the caller display message.

As an extension to the 141 service, in some instances it will be necessary to provide the CLI Withheld Service for all calls from a particular line. In this case CLI will be withheld for all calls and there will be no need to prefix each call with 141. CLI can be sent on a per call basis in this instance by dialling the prefix 1470.

141 AND THE IMPACT ON TE

It is important that TE should support the prefix 141 for customers wishing to withhold their CLI. TE suppliers should note that chargeable calls could start with the prefix 141. This could affect payphones, call-logging equipment, barring equipment and possibly private network numbering schemes.

The digits 141 will be treated as a service activation code and absorbed at the local exchange. There will be no second dial tone or confirmation to the caller after 141. The caller will be able to dial the rest of the call in the normal way immediately after 141. Onwards routing on the basis of the remaining digits will take place as usual and provide access to other operators using their normal access codes.

MALICIOUS CALL TRACE

The use of 141 will not prevent operation of the malicious call trace capability of the network. The malicious call trace is a network operator function.

### B.2 Message Format

This section does not define how TE should process, store or display information contained within the messages.

The signalling system is the same as that for Calling Line Identification Presentation (CLIP) described in Section A2 of Annex A of this document.

### B.3 CLIP+Call Waiting Message Timing

The Start Point for Call Waiting with Caller Display is the end of the first tone ON portion of the audible Call Waiting Indication.

Loop State CLIP signalling will be sent once (and only once) following the receipt of the Acknowledgement (ACK) signal from the TE (see Figure 3, SIN 227).

TE must recognise the Idle State Tone Alert Signal by detection of both frequencies together. The validation time should be not less than 30ms.

### B.4 Requirements for CLIP Parameters

This subsection identifies some requirements for sending CLIP parameters. These are the same as that for Calling Line Identification Presentation (CLIP) described in Section A.4 of Annex A of this document.

### B.5 Message Length

This is the same as that for Calling Line Identification Presentation (CLIP) described in Section A.5 of Annex A of this document.

### B.6 Message Structure Example

This is the same as that for Calling Line Identification Presentation (CLIP) described in Section A.6 of Annex A of this document.

END